



## Flames of Change: Fire at Mammoth Cave National Park



### Fire in the Natural Order



The year 2002 was a turning point in the ecological health of Mammoth Cave National Park. After an almost 200 year absence, fire has once again been allowed to take its place in the natural order of the park's forest communities as the National Park Service inaugurates the Mammoth Cave National Park Fire Management Plan.

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### Fires and Ecology

In April 2002, two "prescribed" fires were set in the park under strictly controlled circumstances to begin the process of reversing the effects of total fire suppression.

Humankind has been "managing" landscape through the use of fire for thousands of years as native cultures around the world routinely set fires to clear land and improve grazing and hunting. Fire was firmly rooted in the Native American way of life, but post-columbian immigrants to the new world did not embrace the presence of fire and suppression of all fires became the rule.

In 1802, botanist François Michaux visited the Mammoth Cave area and described the use of fire in maintaining the area's open prairies. "Every year, in the course of the months of March or April, the inhabitants set fire to the grass, which at that time is dried up...The custom of burning the meadows was formerly practiced by the natives, who came to this part of the country to hunt."

By the time the National Park movement began in the United States, fire suppression was the accepted land management policy. When the Na-

tional Park Service was established in 1916, its purpose was stated as: "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as to leave them unimpaired for the enjoyment of future generations." For nearly sixty years "to conserve the scenery" meant that all fires, no matter how they started, were to be put out as quickly as possible.

As the young science of ecology began to look at the interactions of various parts of nature, fire's place in the natural order of things began to be examined. As early as the 1930's land managers in the southeast began to argue for the return of more frequent fires. In 1965 the Giant Sequoia trees of the Sierra Nevada mountains of California, among the largest living things on earth, were shown to be dependent on periodic fires for successful reproduction. As a result, in 1968 Sequoia National Park established *A Plan for Use of Fire in Ecosystem Management* which called for setting

"prescribed" fires under strictly defined conditions. Since that time many other western forest and chaparral type habitats have been discovered to be fire dependent, and the reestablishment of natural fire patterns through prescribed fires has become an accepted practice.

The 52,830 acres of Mammoth Cave National Park contain not one but several types of forest communities. The location and make up of these communities is dictated by a number of environmental factors, such as: what type of bedrock the soil comes from, how much moisture is available, the degree of slope, and what direction the hillside faces. In the broadest terms these communities can be listed as: dry hardwood forests/savannas, wet upland hardwoods, wet river bottom and valley hardwoods, mixed coniferous/hardwoods, coniferous forest, and open prairie. Obviously the drier a forest type the more likely it is to have fire as a part of its natural cycle. The dry hardwoods/savannas, along with the drier mixed coniferous/hardwoods and the open prairies, are the natural communities most changed by fire suppression.

Interestingly, Mammoth Cave itself gives us clues as to the pre-settlement make up of the park woodlands. Native Americans entered and explored Mammoth Cave mostly between 2000 and 3000 years ago. These prehistoric cavers left behind abundant artifacts and the stable environment of the cave has preserved them to the present. Many of these ancient materials consist of plant remains, and provide insight into the vegetation readily available. Pollens recovered during archeological excavations reveal an abundance of lamb's quarters, grasses, and ragweed in strata dated to be between 3,000 and 3,500 years old. Also, examination of paleofeces has revealed an increase in edible weed seeds, such as sunflower, sumpweed, amaranth, panic grass, and maygrass. Since these species require direct sunlight, a forest type other than a closed canopy forest must have been present.

The materials used for torches and the remains of footwear of these ancient cavers also point to the existence of open forest conditions. Three types of torch materials were used, cane, false foxglove, and goldenrod. Both false foxglove and goldenrod are light loving species. False foxglove is also known to be a parasite on oaks and large natural populations are found at the margins of oak stands. Oak savannas or openings bordering oak stands must have once been much more prevalent, since false foxglove is very infrequent in the park today. The slippers worn by Native American cavers were

often manufactured from leaves of rattlesnake master. This species is restricted to savanna and prairie communities and like false foxglove is currently very limited within the park.

But how do we reintroduce fire? Obviously, great care must be taken to ensure that fires are managed for the safety of park visitors, neighbors, and employees. They also must be conducted in such a way as to duplicate the effects that fire would have had naturally. This is where the fire management plan comes in.

The Mammoth Cave National Park Fire Management Plan lists four key objectives:

- Suppress all wildland fires
- Conduct prescribed fire program
- Raise public awareness
- Establish and maintain cooperation with neighboring fire departments

Mammoth Cave National Park's boundaries are not defined by obvious natural features that would provide natural fire barriers. The boundary is completely contiguous with neighboring private property. Any fire started by lightning, human error, or arson will therefore be put out. The methods used will vary from situation to situation, but fire suppression actions will be balanced between the primary need to protect all private property and the desire to use methods with as little environmental damage as possible.

Prescribed fires is conducted primarily as an ecological restoration program, to reduce unnaturally heavy fuel loads and restore habitat. The restoration goals are based upon archaeological and historical evidence of pre-settlement fire patterns. Prescribed Fire Areas have been defined in each section of the park. Fire will be reintroduced into these areas only after carefully prescribed conditions are met. The first prescribed fires were conducted in spring 2002 in the Temple Hill and Flint Ridge areas of the park. A total of 110 acres were burned. A fire effects monitoring program is part of the prescribed fire program and will ascertain if the identified objectives are met and if the desired long-term ecological changes are occurring.

Obviously, people need to understand why Mammoth Cave National Park is now setting fires after a long-held policy of fire suppression. Park staff and fire managers have been meeting with local civic groups and decision makers to explain the importance of fire to the park's forest communities and

the efforts being made to ensure that all property is protected.

Mammoth Cave National Park has been working for many years with the fire departments surrounding the park. This new approach to fire management has expanded and strengthened these relationships. Education, training, and new wild-fire fighting equipment has been provided to local departments, and prescribed fires are conducted in consultation with the park's partner fire departments.

Fire has been a part of the natural order since lightning has been striking trees and other combustible materials. Humans have used fire for many thousands of years to manage the landscape for their benefit. Only relatively recently have we tried to separate ourselves from fire's natural role in the landscape. Our comparatively brief attempt to exclude fire from our nation's forest preserves has proven counterproductive. As we enter the 21<sup>st</sup> Century, Mammoth Cave National Park has begun the process of restoring fire to the ecosystem and recovering the park's full diversity of plant and animal life.